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THE
Anthropometric Manual
OF
AMHERST COLLEGE.
1887.

AMHERST COLLEGE. *Dep of Physical*

AN

Anthropometric Manual,

GIVING THE AVERAGE AND

MEAN PHYSICAL MEASUREMENTS AND TESTS

OF MALE COLLEGE STUDENTS.

AND METHOD OF SECURING THEM.

PREPARED FROM THE RECORDS OF THE DEPARTMENT OF PHYSICAL
EDUCATION AND HYGIENE IN AMHERST COLLEGE, DUR-
ING THE YEARS 1861-2 AND 1886-7, INCLUSIVE.

BY DR. E. HITCHCOCK, ASSISTED BY DR. H. H. SEELYE.

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The following tables are given to the students of Amherst College because the material from which they are made is furnished by those who have been connected with the college from 1861-2 to 1886-7, and it is but right that they should enjoy the fruit of the seed they have sown. Besides this, the question has been not infrequently asked "What is the use of all these measures and tests?" and if many will remember the answer that has not infrequently been given: "Wait till we get these data by the thousands and we can then show you what are the form and conditions of an average student."

So now college men are of themselves able to judge whether they are up to the standard of the average student, or whether they surpass or fall below him in the conditions and characteristics offered in these pages.

The idea of the *Typical Man* has been in the brain of the anthropologist for these many years, and in certain classes and conditions of society, such as soldiers, sailors, cracksmen, prisoners, and others directly under the control of Governments quite approximate results no doubt have been obtained. And yet to nearly all of these there is the objection that they are selected classes, and will give results which surpass those of the average man, or the "plain people" that Mr. Lincoln used to talk about. But it seems fair to judge that the New England College Student, averaging about 21 years of age, who is neither overworked in body or pampered by luxurious ease or indulgence, would furnish an average, or a mean, that could be used in an Anthropometric study of the Anglo-Saxon Race, for a better conclusion than those mentioned.

And certainly we can say to the student who comes to Amherst College that in this pamphlet are facts and data, of both a numerical as well as a physiological character, which will help him to learn his resources, and his relation to the mass of students in his college for the past twenty-five years—and to-day—and to compare himself with the "Typical" Student whenever this personage is satisfactorily worked out.

In addition to these tables, there is to be found the detailed method of securing these statistics as taken at Amherst College.

The first beginnings of this scheme or method are to be found in the eight items of age, weight, height, chest girth, arm girth, forearm girth, lung capacity and pull up, which were secured from every student in Amherst College since 1861 till about the year 1881, when more elaborate and multiplied items were suggested by Dr. W. T. Brigham of Boston, which were much better methodised and arranged by Dr. D. A. Sargent of Harvard College and first used here in 1882.

In 1885 the American Association for the Advancement of Physical Education, at a meeting in Brooklyn appointed an Anthropometric Committee consisting of Dr. D. A. Sargent of Cambridge,

Dr. E. Hitchcock of Amherst, and Dr. W. G. Anderson of Brooklyn to propose a uniform method of taking and securing these statistics. At the meeting of the Association in 1886 this report was made, accepted and adopted by the Association, a copy of which follows the tables in this pamphlet. And it is this method which is practically used at Amherst to-day, as the fundamental parts of it have been used for the past 26 years.

The FIRST TABLE offers to the student the series of measurements and tests of men in college who have been exactly of HIS OWN HEIGHT—within a centimeter, or about half an inch—and with no reference to any other bodily characteristic as a standard. This is considered a more reliable and unchanging criterion than is that of age, weight, or the showing of means or averages, since bodily proportions in the average man will be much more controlled by height than any other datum.

When the student is examined by one of the Physicians in the Department on his entrance to college, his own record will be placed in the blank column of one of the tables, each item of his own being inserted directly against the average printed item, as derived from those of his own perpendicular height who have gone before him.

With this ideal at his own immediate command, by many measures and tests which he may himself repeat, in many cases at least, he can learn if he gains, loses, or remains constant, or he may request a repetition of the examination from the Professor or his assistant, and thus he can the better know himself all the while he is in college, and perhaps through life.

The SECOND TABLE gives results the most comprehensive of all the tables offered. This embraces certain statistics secured from all the students who have been connected with the college since 1861-2. These added together and divided by the number of students furnishing them give us an average, or approximate ideal of what an Amherst Student has been for a quarter of a century. This table can essentially aid the student by gratifying a general desire, common everywhere and to everybody, to know his relation to the general average, and whether he be up to or below the medium qualification and condition of his associates.

The THIRD TABLE is based entirely upon the element of AGE, which characteristic is much modified in the individual by both present and past surroundings of life. When however combined with the history of the man, and his ancestry and circumstances bearing upon sanitary matters, it may serve a good purpose in predicting the possibilities of longevity, rather than declaring the muscular and organic development of the individual. People of the same age vary greatly in their bodily proportions, and yet the short man may live a long life, and the tall man a short one. And it is very natural to want to compare one's self with those of his own age.

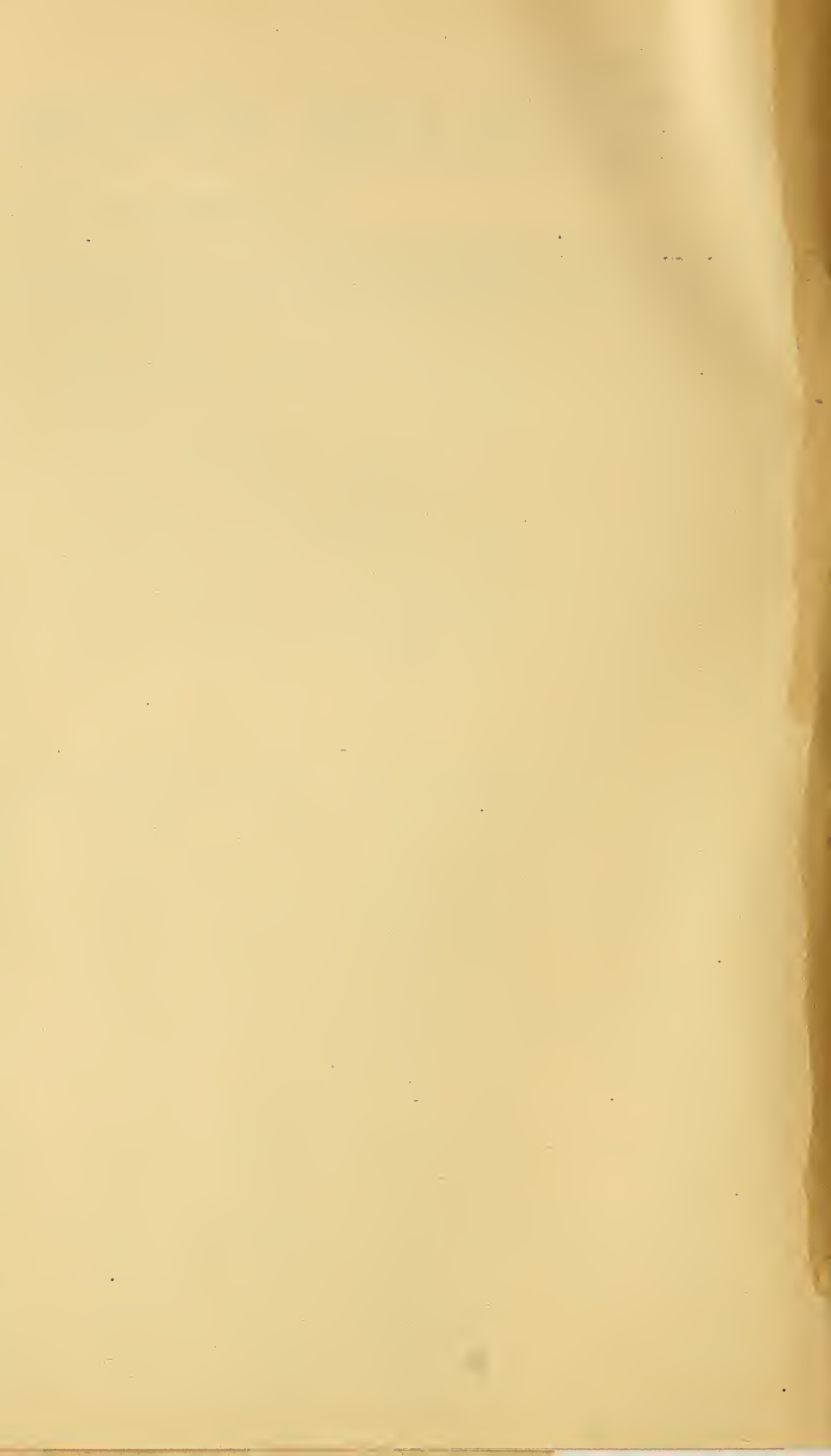
TABLE I.

ANTHROPOMETRIC TABLE

ARRANGED BY BODILY HEIGHTS.

HEIGHT in m.m.		1600	1610	1620	1630	1640	1650	1660	1670	1680	1690	1700	1710	1720	1730	1740	1750	1760	1770	1780	1790	1800	1810	1820	1830
HEIGHT in inches.		63.0	63.4	63.8	64.2	64.6	65.0	65.4	65.7	66.1	66.5	66.9	67.3	67.7	68.1	68.5	68.9	69.3	69.7	70.1	70.5	70.9	71.3	71.7	72.0
HEIGHT	WEIGHT.	53.9	54.0	54.1	54.5	54.7	55.5	57.3	57.9	60.1	61.5	61.3	61.3	61.7	62.1	62.5	63.9	65.1	67.8	67.8	68.0	68.2	68.2	68.3	68.3
		118.5	118.8	119.0	119.9	120.9	122.1	127.1	127.1	133.3	133.3	134.8	134.8	135.7	136.6	137.5	143.0	149.1	149.1	149.6	150.0	150.0	150.7	150.7	150.7
	Knee.	125	130	139	142	148	148	150	154	160	161	161	161	161	161	161	161	161	161	161	161	161	161	161	161
	Sitting.	167	169	173	174	176	176	177	178	181	186	187	187	188	190	191	193	196	197	197	197	197	197	197	197
	Pubes.	851	856	869	870	879	880	883	884	891	905	908	908	910	918	918	924	925	925	925	925	925	925	925	925
GIRTH	Navel.	397	800	810	812	814	820	835	839	853	862	863	863	867	870	874	880	886	895	896	899	907	918	919	921
	Sternum.	1290	1300	1300	1320	1330	1340	1350	1350	1360	1400	1400	1400	1400	1430	1440	1440	1440	1440	1450	1450	1460	1470	1480	1505
	Head.	55.9	56.1	56.2	56.2	56.3	56.3	56.5	56.5	56.5	56.6	57.1	57.1	57.2	57.2	57.2	57.2	57.3	57.4	57.5	57.6	58.2	58.2	58.3	58.3
	Neck.	33.5	33.8	34.0	34.5	34.5	34.6	34.7	34.8	34.8	35.0	35.0	35.2	35.3	35.4	35.4	35.5	35.5	35.5	35.6	35.6	35.6	35.6	35.6	35.6
	Chest Full.	881	882	888	900	900	901	903	904	905	909	913	916	926	930	931	931	931	931	931	936	936	938	939	939
BREADTH	Chest Repose.	851	852	854	857	857	864	865	868	872	872	878	880	887	887	888	888	890	890	890	890	891	898	898	899
	Belly.	702	703	703	708	708	709	710	710	714	722	723	723	723	726	729	731	738	738	741	741	748	748	748	749
	Hips.	860	860	864	864	873	879	881	882	882	881	886	886	888	895	896	908	912	912	912	916	921	921	921	923
	Thigh.	499	500	500	500	503	503	505	508	516	516	516	517	518	519	520	520	521	522	522	522	523	523	525	528
	Knee.	340	340	341	342	343	345	346	347	350	351	353	354	356	359	359	363	364	365	365	366	368	368	368	368
LENGTH	Calf.	324	325	325	334	335	336	339	341	344	344	345	346	346	350	350	351	352	352	352	353	353	355	355	355
	Instep.	230	230	231	232	233	234	234	235	235	236	236	238	240	241	243	243	244	244	245	246	246	246	246	246
	R. U. Arm contr'd.	275	277	280	280	282	283	285	285	287	287	290	292	293	295	296	296	296	296	296	297	300	300	300	300
	Upper Arm.	246	246	246	250	251	252	252	252	255	255	255	255	258	258	259	259	259	259	260	260	260	261	261	262
	Elbow.	239	239	240	240	240	242	243	243	245	247	247	247	250	250	252	252	252	253	253	254	254	254	254	255
STRENGTH	Forearm.	250	250	250	251	251	252	253	254	256	258	258	259	260	260	261	261	261	262	263	264	265	265	266	266
	Wrist.	160	160	161	161	161	161	161	162	162	163	165	165	165	165	166	166	167	167	167	168	169	170	170	171
	Head.	151	151	151	152	152	152	153	153	153	153	153	153	153	153	154	154	154	154	154	155	155	156	156	156
	Neck.	104	104	106	106	106	107	107	107	108	108	108	108	108	109	109	109	109	109	109	109	109	109	109	109
	Shoulders.	413	416	418	419	423	424	429	431	431	431	431	431	432	432	432	433	433	438	438	438	439	439	440	445
STRENGTH	Waist.	245	245	245	245	247	248	248	250	252	252	253	253	254	254	254	254	254	256	256	256	256	260	263	263
	Hips.	313	313	315	316	316	316	316	316	318	320	324	324	332	332	332	335	335	335	335	336	337	340	341	341
	Nipples.	191	192	192	193	193	194	195	196	196	196	196	196	197	198	198	199	199	200	200	201	205	206	206	206
	Shoulder Elbow.	347	350	351	352	355	356	360	364	364	365	366	368	371	374	375	378	380	381	382	393	394	394	395	396
STRENGTH	Elbow Tip.	430	434	436	438	442	443	445	445	446	450	455	457	460	465	468	468	468	470	475	480	484	485	486	488
	Foot.	242	244	244	244	247	249	252	252	252	253	256	259	260	264	264	265	265	266	267	270	273	274	274	276
	Stretch of Arms.	1660	1660	1690	1690	1700	1700	1700	1720	1730	1740	1770	1770	1780	1810	1810	1810	1810	1810	1820	1850	1870	1880	1890	1890
	Horizontal Length.	1610	1620	1640	1650	1650	1660	1680	1680	1690	1700	1750	1760	1760	1770	1770	1770	1780	1780	1790	1790	1790	1820	1840	1840
STRENGTH	Lungs.	1.5	1.3	1.4	1.2	1.2	1.3	1.2	1.2	1.2	1.1	1.3	1.1	1.1	1.3	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.1	1.2	1.2
	Back.	126	126	126	126	126	127	128	128	129	130	135	136	137	138	140	140	140	141	141	141	142	145	147	147
	Dip.	10	7	8	9	8	6	7	6	7	6	6	7	6	5	6	5	5	5	5	5	5	6	6	6
	Pull up.	11	10	10	11	9	10	11	10	10	10	9	9	10	10	8	7	8	8	9	8	9	8	8	11
	Legs.	130	143	147	148	149	150	151	154	159	160	163	164	164	165	167	168	168	169	171	172	173	174	174	174
STRENGTH	Forearm.	33	33	33	34	34	35	35	35	37	38	38	38	39	39	39	39	39	40	41	41	41	41	42	42
	Total.	426	463	438	455	478	397	363	427	464	434	426	405	452	459	433	437	457	432	427	462	462	462	462	462
	LUNG CAPACITY.	3.45	3.51	3.55	3.57	3.64	3.76	3.82	3.84	3.87	3.93	3.96	4.00	4.14	4.26	4.30	4.39	4.40	4.42	4.57	4.72	4.75	4.75	4.75	4.75
	PILOSITY.	2.10	2.2	2.2	2.4	2.5	2.4	2.3	2.3	2.3	2.4	2.1	2.2	2.4	1.7	2.5	2.8	2.6	2.6	2.2	2.3	2.2	2.4	2.6	2.5

NOTE—The "Weight" is recorded in *kilos*, and in *pounds*. In the series of "Strength" all but "Pull" and "Dip" are recorded in the same way. "Lung Capacity" is given in *litres* and in *cubic inches*: the "Dip" and "Pull Up" the number of times the body is drawn or pushed up; and by "Pilosity" is meant the amount of the body which is covered by hair; supposing the surface of the body to be divided into ten parts. All the rest of the measures are expressed in *millimeters*, and in *inches*.



It will be observed that the succession of items here is not so perfect as it is in the Table of Height, partly because of a smaller number of students observed, but mainly owing to the fact that age is probably not so good a basis of comparison for the physical measurements.

The FOURTH TABLE is prepared by grouping together the items and arranging them by their simple NUMERICAL QUANTITIES. Taking for example the item of Height, and placing together the shortest student measuring say 1600 m.m., we shall find but a few of these. Then selecting those who measured 1610 m.m., we shall find a few more individuals, and so on, till we reach a point at which the numbers begin to fall off till we reach the very tallest persons who will be say 1830 m.m. or six feet, the tallest men. This point at which we have found the greatest number of the series or the top of a curve is 1724 m.m. or 67.7 inches. This we say is the mean or medium height of a student of Amherst College, a point, or a criterion, all deviations from which may be regarded as deviations from a standard, since it represents the largest actual number of objects in this group of characteristics. By thus grouping all of the fifty-four items observed the Table No. IV is constructed. Or, if represented by an upward curve the lowest and highest objects will place themselves at the ends of the curve, and the one which has the largest number of representatives at the top of the curve; the medium or mean will be at the height of the curve.

The Table No. V. is mainly of college interest as showing the difference in classes. Of course it is paralleled somewhat with Table No. III, and corroborated by it. And the fact is shown that the growth and increase is more conspicuous during the early than the later college years. The physiological truth is also corroborated that bodily growth is mainly attained before the period of majority, as is always recognised in civil law.

The detailed method of securing these statistics is to be found in the report of the Anthropometric Committee of the American Association for the Advancement of Physical Education made in November, 1886 at Brooklyn, New York, which is in a subsequent part of this manual.

THE
ANTHROPOMETRIC CARD
OF

Mr.

at the age of *years,* *months, made out this day,*

.....
His height is between *and* *millimeters,*
or *and* *inches.*

Condition of

Eyes :

Ears :

Heart :

Lungs :

Muscles :

Anthropometric Card of

HEIGHT in m.m.		1680	1690	1700	1710	1720	1730	1740	1750
HEIGHT in inch's		66.1	66.5	66.9	67.3	67.3	68.1	68.5	68.9
WEIGHT.		60.1 132.0	61.5 135.3	61.3 134.8	61.3 134.8	61.7 135.7	62.1 136.6	62.5 137.5	63.9 140.5
HEIGHT	Knee.	460 18.1	473 18.6	474 18.7	474 18.7	478 18.8	484 19.0	486 19.1	486 19.1
	Sitting.	891 35.0	905 35.6	908 35.7	908 35.7	910 35.8	918 36.1	918 36.2	918 36.2
	Pubes.	853 33.6	862 34.0	863 34.0	863 34.0	867 34.1	870 34.3	874 34.4	880 34.6
	Navel.	991 39.0	1020 40.2	1020 40.2	1020 40.2	1020 40.2	1040 40.9	1050 41.3	1050 41.3
	Sternum.	1360 53.5	1400 55.1	1400 55.1	1400 55.1	1430 56.3	1440 56.7	1440 56.7	1440 56.7
GIRTH	Head.	565 22.2	566 22.2	571 22.4	571 22.4	572 22.5	572 22.5	572 22.5	572 22.5
	Neck.	348 13.7	350 13.8	350 13.8	352 13.9	353 13.9	354 13.9	354 14.0	355 14.0
	Chest Full.	905 35.6	909 35.8	913 35.9	916 36.0	926 36.4	930 36.6	931 36.6	931 36.6
	Chest Repose	872 34.4	872 34.3	876 34.5	880 34.6	887 34.8	887 34.8	888 34.9	889 35.0
	Belly.	714 28.1	722 28.4	772 28.4	723 28.4	723 28.4	726 28.5	729 28.7	731 28.7
	Hips.	882 34.9	884 34.7	886 34.8	886 34.8	888 34.9	895 35.2	896 35.6	908 35.7
	Thigh.	516 20.3	516 20.3	516 20.3	517 20.3	518 20.4	519 20.5	520 20.5	520 20.5
	Knee.	350 13.8	351 13.8	353 13.9	354 13.9	356 14.0	359 14.2	359 14.2	363 14.3
	Calf.	344 13.6	344 13.6	345 13.6	346 13.6	346 13.6	350 13.8	350 13.8	351 13.8
	Instep.	235 9.3	236 9.3	236 9.3	238 9.4	240 9.4	241 9.4	243 9.5	243 9.5
	R.U. Arm c'd.	287 11.2	287 11.3	290 11.4	292 11.5	293 11.6	295 11.6	296 11.6	296 11.6
	Upper Arm.	255 10.0	255 10.0	255 10.0	255 10.0	258 10.1	258 10.1	259 10.2	259 10.2
	Elbow.	245 9.6	247 9.7	247 9.7	247 9.7	250 9.8	250 9.8	252 9.9	252 9.9
	Forearm.	256 10.1	258 10.1	258 10.1	259 10.2	260 10.2	260 10.2	261 10.3	261 10.3
	Wrist.	162 6.4	163 6.4	165 6.5	165 6.5	165 6.5	165 5.5	166 6.6	166 6.5

Anthropometric Card of

HEIGHT in m.m.		1760	1770	1780	1790	1800	1810	1820	1830
HEIGHT in inch's		69.3	69.7	70.1	70.5	70.9	71.3	71.7	72.0
WEIGHT.		65.1 143.0	67.8 149.1	67.8 149.1	68.0 149.6	68.2 150.0	68.2 150.0	68.3 150.7	68.3 150.7
HEIGHT	Knee.	489 19.3	494 19.6	499 19.7	500 19.7	504 19.9	517 20.3	519 20.5	525 20.7
	Sitting.	924 36.3	925 36.4	925 36.4	933 36.7	934 36.7	937 36.8	939 37.0	939 37.0
	Pubes.	886 34.8	895 35.2	896 35.2	899 35.4	907 35.7	918 36.1	919 36.2	921 36.3
	Navel.	1060 41.7	1060 41.7	1070 42.1	1080 42.5	1090 42.5	1090 42.9	1090 42.9	1120 44.1
	Sternum.	1440 56.7	1450 57.1	1450 57.1	1460 57.5	1470 57.9	1480 58.3	1480 58.3	1505 59.1
GIRTH	Head.	573 22.5	574 22.6	575 22.6	576 22.6	582 22.8	582 22.9	583 23.0	583 23.1
	Neck.	355 14.0	355 14.0	356 14.1	356 14.1	356 14.1	356 14.1	356 14.1	356 14.1
	Chest Full.	931 36.6	934 36.7	936 36.8	936 36.9	938 37.0	939 37.0	953 37.5	956 37.7
	Chest Repose	890 35.0	890 35.0	891 35.1	893 35.1	894 35.2	898 35.3	898 35.3	899 35.4
	Belly.	738 29.0	738 29.0	741 29.2	745 29.3	748 29.4	748 29.4	748 29.4	749 29.5
	Hips.	912 35.9	912 35.9	912 35.8	916 36.1	921 36.2	921 36.2	922 36.3	923 36.4
	Thigh.	521 20.5	522 20.6	522 20.6	522 20.6	523 20.6	523 20.6	525 20.7	528 20.8
	Knee.	364 14.3	365 14.4	365 14.4	366 14.4	368 14.5	368 14.5	368 14.5	368 14.5
	Calf.	352 13.9	352 13.9	352 13.9	353 13.9	353 13.9	355 14.0	355 14.0	355 14.0
	Instep.	244 9.5	244 9.5	245 9.6	246 9.6	246 9.6	246 9.6	246 9.6	246 9.6
	R.U.Arm c'd.	296 11.6	296 11.6	297 11.7	300 11.8	300 11.8	300 11.8	300 11.8	300 11.8
	Upper Arm.	259 10.2	259 10.2	260 10.2	260 10.2	260 10.2	261 10.2	261 10.2	262 10.3
	Elbow.	252 9.9	253 9.9	253 9.9	254 10.0	254 10.0	254 10.0	254 10.0	255 10.0
	Forearm.	261 10.3	262 10.3	263 10.3	264 10.3	265 10.4	265 10.4	266 10.5	266 10.5
	Wrist.	167 6.6	167 6.6	167 6.6	168 6.6	169 6.6	170 6.7	170 6.7	171 6.8

Anthropometric Card of

HEIGHT in m.m.		1600	1610	1620	1630	1640	1650	1660	1670
HEIGHT in inch's		63.0	63.4	63.8	64.2	64.6	65.0	65.4	65.7
BREADTH	Head.	151 5.9	151 5.9	151 5.9	152 5.9	152 6.0	152 6.0	153 6.0	153 6.0
	Neck.	104 4.1	104 4.1	106 4.1	106 4.1	106 4.1	107 4.1	107 4.2	107 4.2
	Shoulders.	413 16.2	416 16.3	418 16.4	419 16.4	423 16.6	424 16.6	429 16.9	431 16.9
	Waist.	245 9.6	245 9.6	245 9.6	245 9.6	247 9.6	248 9.7	248 9.7	250 9.8
	Hips.	313 12.3	313 12.3	315 12.4	316 12.4	316 12.4	316 12.4	316 12.5	318 12.5
	Nipples.	191 7.5	192 7.6	192 7.6	193 7.6	193 7.6	194 7.6	195 7.7	196 7.7
LENGTH	Sh'lder Elbow	347 13.5	350 13.8	351 13.8	352 13.9	355 14.0	356 14.0	360 14.2	364 14.3
	Elbow Tip.	430 16.9	434 17.0	436 17.1	438 17.1	442 17.4	443 17.4	445 17.5	445 17.5
	Foot.	242 9.5	244 9.5	244 9.5	244 9.5	247 9.6	249 9.8	252 9.8	252 9.9
	Stretch Arms.	1660 65.4	1690 66.5	1690 66.5	1690 66.5	1700 66.9	1700 66.9	1700 66.9	1720 67.7
	Hor'l Length.	1610 63.4	1620 63.8	1640 64.6	1650 65.0	1650 65.0	1660 65.4	1680 66.1	1680 66.1
STRENGTH	Lungs.	1.5 3.3	1.3 2.8	1.4 3.0	1.2 2.6	1.2 2.6	1.3 2.8	1.2 2.6	1.2 2.6
	Back.	126 275.0	126 277.2	126 277.2	126 277.2	126 277.2	127 279.4	128 281.6	129 283.8
	Dip.	10	7	8	9	8	6	7	6
	Pull up.	11	10	10	11	9	10	11	10
	Legs.	130 286.0	143 314.6	147 323.4	148 325.6	149 327.0	150 330.0	151 332.2	154 338.8
	Forearm.	33 72.6	33 72.6	33 72.6	34 74.8	34 74.8	35 77.0	35 77.0	35 77.0
	Total.	462 1016.4	463 1018.6	438 963.6	455 1001.0	378 831.6	397 873.4	363 798.6	427 939.4
LUNG CAP'TY.		3.45 210.0	3.51 215.0	3.55 216.0	3.57 220.0	3.64 222.0	3.76 230.0	3.82 234.0	3.84 235.0
PILOSITY.		2.2	2.2	2.4	2.5	2.4	2.4	2.3	2.2

Anthropometric Card of

HEIGHT in m.m.		1680	1690	1700	1710	1720	1730	1740	1750
HEIGHT in inch's		66.1	66.5	66.9	67.3	67.3	68.1	68.5	68.9
BREADTH	Head.	153 6.0	153 6.0	153 6.0	153 6.0	153 6.0	153 6.0	154 6.1	154 6.1
	Neck.	108 4.2	108 4.2	108 4.2	108 4.2	108 4.2	109 4.2	109 4.3	109 4.3
	Shoulders.	431 16.9	431 16.9	431 16.9	431 16.9	432 17.0	432 17.0	432 17.0	433 17.0
	Waist.	252 9.8	252 9.8	253 9.9	253 9.9	254 10.0	254 9.9	254 9.9	254 9.9
	Hips.	320 12.6	324 12.7	330 13.0	332 13.0	332 13.1	332 13.1	335 13.2	335 13.2
	Nipples.	196 7.7	196 7.7	196 7.7	196 7.7	197 7.7	198 7.7	198 7.8	199 7.9
LENGTH	Sh'lder Elbow	364 14.3	365 14.4	366 14.4	368 14.5	371 14.6	374 14.8	375 14.8	378 14.9
	Elbow Tip.	446 17.5	450 17.7	455 17.9	457 17.9	460 18.1	465 18.3	468 18.3	468 18.4
	Foot.	252 9.9	253 9.9	256 10.0	259 10.1	260 10.2	264 10.3	264 10.3	265 10.4
	Stretch Arms.	1730 68.1	1740 68.5	1770 69.7	1770 69.7	1780 70.1	1810 71.3	1810 71.3	1810 71.3
	Hor'l Length.	1690 66.5	1700 66.9	1750 68.9	1760 69.3	1760 69.3	1770 69.7	1770 69.7	1770 69.7
STRENGTH	Lungs.	1.2 2.6	1.1 2.4	1.3 2.8	1.1 2.4	1.1 2.4	1.3 2.8	1.2 2.6	1.2 2.6
	Back.	130 286.0	135 297.0	136 299.1	137 301.4	138 303.6	140 308.0	140 308.0	140 308.0
	Dip.	7	6	6	6	7	6	5	6
	Pull up.	10	10	9	9	10	10	8	7
	Legs.	159 349.8	160 352.0	163 358.6	164 360.8	164 360.8	164 360.8	165 363.0	167 367.4
	Forearm.	37 81.4	38 83.6	38 83.6	38 83.6	38 83.6	39 85.8	39 85.8	39 85.8
	Total.	464 1020.8	434 954.8	426 937.2	405 891.0	452 994.4	459 1009.8	433 952.6	437 961.4
LUNG CAP'TY.		3.87 237.0	3.93 240.0	3.96 241.0	4.00 250.0	4.14 254.0	4.26 260.0	4.27 260.0	4.30 264.0
PILOSITY.		2.3	2.4	2.2	2.4	1.7	2.5	2.3	2.8

Anthropometric Card of

HEIGHT in m.m.		1760	1770	1780	1790	1800	1810	1820	1830
HEIGHT in inch's		69.3	69.7	70.1	70.5	70.9	71.3	71.7	72.0
BREADTH	Head.	154 6.1	154 6.1	154 6.1	155 6.1	155 6.1	156 6.2	156 6.2	156 6.2
	Neck.	109 4.3	109 4.3	109 4.3	109 4.3	109 4.3	109 4.3	109 4.3	109 4.3
	Shoulders.	433 17.0	438 17.2	438 17.2	438 17.2	439 17.3	439 17.3	440 17.3	445 17.5
	Waist.	254 9.9	256 10.1	256 10.1	256 10.1	256 10.1	260 10.2	263 10.3	263 10.3
	Hips.	335 13.2	335 13.2	336 13.2	337 13.3	340 13.3	341 13.4	341 13.4	341 13.4
	Nipples.	199 7.9	200 7.9	200 7.9	201 7.9	201 7.9	205 8.1	206 8.2	206 8.2
LENGTH	Sh'lder Elbow	380 15.0	381 15.0	382 15.1	393 15.5	394 15.6	394 15.6	395 15.6	396 15.7
	Elbow Tip.	468 18.4	470 18.5	475 18.7	480 18.9	484 19.0	485 19.1	486 19.1	488 19.2
	Foot.	265 10.4	266 10.4	267 10.4	270 10.6	273 10.7	274 10.8	274 10.8	276 10.9
	Stretch Arms.	1810 71.3	1810 71.3	1820 71.7	1850 72.8	1870 73.6	1880 74.0	1890 74.4	1890 74.4
	Hor'l Length.	1770 69.7	1780 70.1	1780 70.1	1790 70.5	1790 70.5	1790 70.5	1820 71.7	1840 72.4
STRENGTH	Lungs.	1.2 2.6	1.3 2.8	1.2 2.6	1.2 2.6	1.1 2.4	1.2 2.6	1.1 2.4	1.2 2.6
	Back.	141 310.0	141 310.2	141 310.2	142 312.4	145 319.0	147 323.4	147 323.4	148 325.6
	Dip.	5	5	5	5	5	5	6	6
	Pull up.	8	8	8	9	8	8	8	11
	Legs.	168 369.6	168 369.6	169 371.8	171 376.2	172 378.4	173 380.0	174 382.8	174 382.8
	Forearm.	39 85.8	39 85.8	40 88.0	41 90.2	41 90.2	41 90.2	42 92.4	42 92.4
	Total.	457 1005.4	432 950.4	427 939.4	462 800.4	426 937.2	451 992.2	458 1007.6	478 1051.6
LUNG CAP'TY.		4.39 268.0	4.40 269.0	4.42 270.0	4.57 279.0	4.72 290.0	4.75 290.0	4.75 290.0	4.89 297.0
PILOSITY.		2.6	2.5	2.2	2.3	2.2	2.4	2.6	2.5

TABLE III.

ANTHROPOMETRIC TABLE.

ARRANGED BY AGES.

AGE IN YEARS,		16	17	18	19	20	21	22	23	24	25	26
WEIGHT,		58.6	59.6	59.4	61.0	61.8	63.2	62.2	62.1	64.5	64.4	64.8
		128.9	131.1	130.6	134.2	135.9	139.0	136.8	136.6	141.9	141.4	142.5
HEIGHTS.	Body,	1704	1721	1722	1721	1721	1725	1716	1716	1725	1723	1724
		66.9	67.1	67.1	67.1	67.1	67.9	67.5	67.5	67.9	67.8	67.8
	Sternum,	1349	1407	1408	1403	1406	1412	1400	1407	1407	1444	1450
		53.2	55.5	55.5	55.1	55.5	55.6	55.1	55.5	55.5	56.9	57.1
	Navel,	1006	1023	1028	1024	1024	1022	1018	1018	1040	1043	1047
		39.8	40.2	40.6	40.6	40.6	40.5	40.2	40.2	40.9	41.0	41.3
	Pubes,	856	868	868	863	865	866	859	857	882	850	882
		33.7	34.3	34.3	34.0	34.1	34.1	33.0	33.1	34.6	33.6	34.6
	Knee,	472	475	476	475	474	479	472	473	481	489	493
		18.5	18.7	18.7	18.7	18.6	18.9	18.5	18.6	18.9	19.3	19.3
	Sitting,	887	897	897	903	904	910	907	902	909	913	922
		34.5	35.3	35.3	35.5	35.5	35.8	35.6	35.4	35.8	35.9	36.2
GIRTHS.	Head,	564	569	567	567	568	573	570	571	573	577	572
		22.1	22.4	22.2	22.2	22.2	22.5	22.1	22.1	22.5	22.6	22.5
	Neck,	342	342	346	352	352	360	356	357	363	360	371
		13.4	13.4	13.5	13.9	13.8	14.2	14.0	14.0	14.3	14.2	14.6
	Chest Repose,	845	852	864	878	885	902	899	890	906	914	887
		33.3	33.5	34.0	34.5	34.5	35.1	35.4	35.0	35.5	36.0	35.2
	Chest Full,	889	890	909	925	928	936	938	942	956	951	977
		35.0	35.0	35.8	36.4	36.5	36.8	36.9	37.0	37.6	37.4	38.5
	Belly,	704	705	717	723	725	739	738	743	755	753	772
		27.7	27.8	28.2	28.1	28.5	29.1	29.0	29.2	29.7	29.6	30.3
	Hips,	861	876	877	895	893	899	903	900	911	905	922
		33.9	34.4	34.5	35.2	35.1	35.4	35.5	35.5	35.8	35.6	36.2
	Right Thigh,	501	506	507	514	516	522	519	517	532	519	525
		19.7	19.9	19.9	20.2	20.3	20.5	20.4	20.4	20.9	20.4	20.9
	Left Thigh,	495	503	502	512	511	519	517	514	523	522	531
		19.5	19.8	19.7	20.1	20.1	20.4	20.4	20.4	20.5	20.5	20.9
	Right Knee,	355	355	356	358	358	360	373	354	361	359	345
		14.0	14.0	14.0	14.1	14.1	14.1	14.6	13.9	14.2	13.9	14.1
	Left Knee,	354	355	355	358	359	360	358	353	360	361	365
		14.0	14.0	14.0	14.1	14.1	14.2	14.1	14.0	14.2	14.2	14.4
	Right Calf,	342	338	342	348	347	355	350	349	355	362	356
		13.4	13.3	13.4	13.7	13.7	14.0	13.8	13.8	14.0	14.3	14.5
	Left Calf,	340	337	341	347	347	348	351	347	352	351	353
		13.4	13.3	13.1	13.7	13.7	13.8	13.8	13.7	14.3	13.8	13.9
	Right Instep,	238	238	240	241	242	243	243	243	246	247	252
		9.3	9.3	9.4	9.4	9.5	9.5	9.5	9.5	9.6	9.7	9.8
	Left Instep,	238	237	239	239	239	240	242	242	245	240	247
		9.3	9.3	9.4	9.4	9.4	9.4	9.5	9.5	9.6	9.4	9.6
	R. U. Arm contr'd,	277	280	286	293	297	299	300	298	307	309	307
		11.0	11.0	11.2	11.5	11.7	11.7	11.8	11.7	12.1	12.2	12.1
	Right Upper Arm,	247	252	250	258	260	265	267	267	267	267	266
		9.7	9.8	9.8	10.1	10.2	10.4	10.4	10.4	10.4	10.4	10.4
	Left Upper Arm,	239	242	247	257	254	257	257	255	262	262	262
		9.4	9.4	9.6	9.6	9.6	10.0	10.0	9.6	10.2	10.2	10.2
	Right Elbow,	244	244	247	250	252	254	252	251	254	256	254
		9.5	9.5	9.6	9.8	9.8	9.9	9.8	9.8	9.9	10.0	10.0
	Left Elbow,	239	241	244	245	247	250	249	246	252	249	253
		9.4	9.4	9.5	9.5	9.6	9.8	9.8	9.5	9.8	9.8	9.9
	Right Forearm,	255	258	260	262	263	266	265	260	268	271	267
		10.0	10.1	10.2	10.2	10.3	10.8	10.8	10.2	10.4	10.6	10.8
	Left Forearm,	247	248	253	255	258	259	258	259	264	262	260
		9.8	9.8	9.9	9.9	10.0	10.0	10.0	10.0	10.3	10.2	10.0
	Right Wrist,	165	163	165	165	165	165	165	166	167	167	170
		6.5	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.6	6.6	6.7
	Left Wrist,	164	162	164	163	163	164	163	164	166	165	167
		6.5	6.4	6.5	6.4	6.4	6.5	6.4	6.4	6.6	6.5	6.6
BREASTS.	Head,	152	153	153	153	154	154	154	155	154	156	153
		5.9	5.9	5.9	5.9	6.0	6.0	6.0	6.0	6.0	6.1	5.9
	Neck,	106	105	106	107	109	108	108	108	109	109	111
		4.1	4.1	4.1	4.2	4.2	4.3	4.2	4.2	4.2	4.2	4.3
	Shoulders,	410	424	422	428	431	437	435	430	441	443	446
		16.1	16.7	16.5	16.8	16.9	17.1	17.1	16.9	17.3	17.4	17.5
	Waist,	244	244	248	250	258	255	254	261	265	265	263
		9.6	9.6	9.7	9.8	10.1	10.0	10.0	10.2	10.3	10.3	10.2
LENGTHS.	Hips,	320	320	320	324	324	327	327	327	332	332	333
		12.6	12.6	12.6	12.7	12.9	12.8	12.8	13.0	13.0	13.0	13.1
	Nipples,	185	189	198	194	198	202	201	202	205	204	214
		7.3	7.4	7.8	7.6	7.8	7.9	7.9	8.0	8.1	8.1	8.5
	Right Elbow,	370	373	372	371	371	373	372	374	378	369	387
		14.6	14.7	14.6	14.6	14.6	14.7	14.6	14.7	14.9	14.6	15.2
	Left Elbow,	366	370	370	370	370	371	370	375	378	378	382
		14.4	14.6	14.6	14.6	14.6	14.6	14.6	14.8	14.9	14.9	15.0
	Right Elbow Tip,	458	461	466	459	459	460	459	463	465	459	466
		18.0	18.0	18.3	18.0	18.0	18.1	18.0	18.2	18.3	18.0	18.3
	Left Elbow Tip,	457	457	460	459	458	459	459	460	464	457	465
		17.9	17.9	18.1	18.0	17.9	18.0	18.0	18.1	18.2	18.0	18.2
STRENGTH.	Right Foot,	260	260	258	259	259	261	259	258	264	261	263
		10.2	10.2	10.0	10.0	10.0	10.2	10.0	10.0	10.3	10.2	10.3
	Left Foot,	259	259	258	259	258	260	259	257	263	260	263
		10.0	10.0	10.0	10.0	10.0	10.2	9.9	9.9	10.2	10.2	10.2
	Stretch of Arms,	1770	1774	1780	1780	1781	1778	1779	1797	1802	1825	1833
		69.7	69.7	70.1	70.1	70.1	69.7	70.1	70.7	70.9	71.9	72.0
	Horizontal,	1722	1732	1733	1732	1736	1737	1731	1731	1753	1742	1770
		67.7	68.1	68.1	68.1	68.2	68.2	68.1	68.1	68.8	68.5	69.7
	Lungs,	1.0	1.3	1.3	1.3	1.3	1.4	1.3	1.3	1.4	1.4	1.3
		2.20	2.80	2.80	2.80	2.80	3.08	2.80	2.80	3.08	3.08	2.80
STRENGTH.	Back,	123	120	129	133	137	142	134	141	144	143	141
		27.1	26.4	28.1	29.2	30.1	31.2	29.4	31.0	31.6	31.4	31.0
	Dip,	2.8	4.5	5.6	6.3	7.1	7.3	7.1	7.4	7.4	8.0	6.0
	Pull Up,	7.9	8.0	9.3	9.5	10.0	10.1	10.3	10.0	9.0	10.7	8.8
	Legs,	145	144	157	164	164	176	169	163	166	178	170
		31.9	31.6	34.5	36.0	36.0	38.7	37.1	35.0	36.5	39.1	37.4
	Right Forearm,	33.5	35.6	37.2	38.9	39.0	40.9	40.9	41.3	42.4	43.7	42.5
		73.7	78.3	81.8	85.5	86.8	89.9	89.0	90.8	93.2	94.1	90.5
	Left Forearm,	33.5	37.1	34.3	37.8	40.5	40.0	38.5	36.0	39.6	38.3	39.1
		73.7	81.6	75.4	83.1	89.1	88.2	84.7	79.1	87.1	84.2	86.0
	Total Strength,	372	379	423	436	467	471	464	445	450	421	477
LUNG CAPACITY,		3.82	4.03	4.03	4.33	4.30	4.32	4.29	4.33	4.37	4.63	4.44
PILOSITY.		2.27	2.24	2.44	2.21	2.34	2.45	2.52	2.52	2.64	2.60	2.50

FOR EXPLANATION SEE "NOTE" UNDER TABLE II.

TABLE II.

THE AVERAGE STUDENT as gathered from 7988 individuals in Amherst College between 1861-2—1885-6.

		MET- RIC.	ENG- LISH.			MET- RIC.	ENG- LISH.					
HEIGHTS.	Weight.	Kilos. 61.2	Pounds. 134.6	BREADTHS.	{	m. m.	Inches.					
	{	Body,	1725			m.m. 67.7	Head,	155	6.1			
		Sternum,	1410			55.5	Neck,	108	4.2			
		Navel,	1030			40.6	Shoulders,	430	16.9			
		Pubes,	860			33.9	Waist,	257	10.1			
		Knee,	476			18.7	Hips,	323	12.7			
		Sitting,	903			35.5	Nipples,	198	7.8			
		GIRTHS.	{			Head,	572	LENGTHS.	{	Sh'lder Elbows.	370	14.6
Neck,	349			13.8	Elbow Tips,	464	18.2					
Chest Repose,	880			34.6	Feet,	260	10.2					
Chest Full,	922			36.3	Arm Stretch,	1780	70.1					
Belly,	724			28.4	Hor. Length,	1730	68.1					
Hips,	893			35.1	Lung Capacity.	Liters.	Cub. In.					
Thighs,	515			20.3		2.96	242.5					
Knees,	355			14.0		STENGTHS.	{			Kilos.	Pounds.	
Calves,	345			13.6						Lungs,	1.0	2.20
Insteps,	241			9.4						Back,	147	323.4
R. U. Arm cont'd,	295			11.6						Chest Dip,	6	
Upper Arms,	257			10.0						Chest Pull,	9	
Forearms,	260			10.2						Legs,	185	Pounds. 407.0
Elbows,	249			9.8		Forearms,	39			85.8		
Wrists,	163			6.4		Pilosity,	Part of Body.			2.25		

TABLE IV.

TABLE OF MEANS.

WEIGHT,		60.5 133.1	GIRTHS	Left Forearm,		260 10.2
HEIGHTS.	Body,	1724 67.7		Right Wrist,		160 6.3
	Sternum,	1420 55.9		Left Wrist,		160 6.3
	Navel,	1020 40.2	BREADTHS.	Head,		150 5.9
	Pubes,	860 33.9		Neck,		100 3.9
	Knee,	475 18.7		Shoulders,		430 16.9
GIRTHS.	Sitting,	908 35.7	LENGTHS.	Waist,		250 9.8
	Head,	560 22.0		Hips,		325 12.8
	Neck,	350 13.8		Nipples,		200 7.9
	Chest Repose,	890 35.0	STRENGTH.	Right Sh'lder Elbow,		370 14.6
	Chest Full,	940 37.0		Left Sh'lder Elbow,		370 14.6
	Belly,	740 29.1		Right Elbow Tip,		455 17.9
	Hips,	900 35.4	LUNG CAPACITY,	Left Elbow Tip,		445 17.5
	Right Thigh,	520 20.5		Right Foot,		260 10.2
	Left Thigh,	510 20.1		Left Foot,		255 10.0
	Right Knee,	350 13.8	PILOSITY.	Stretch of Arms,		1781 70.1
	Left Knee,	350 13.8		Horizontal,		1740 68.5
	Right Calf,	340 13.4		Lungs,		1.5 3.30
	Left Calf,	340 13.4	LUNG CAPACITY,	Back,		150 330
	Right Instep,	240 9.4		Chest Dip,		6
	Left Instep,	240 9.4		Chest Pull Up,		10
	R. U. Arm contr'ed,	290 11.4	LUNG CAPACITY,	Legs,		170 374
	Right Upper Arm,	270 10.6		Right Forearm,		40 88.0
	Left Upper Arm,	250 9.8		Left Forearm,		35 77.0
	Right Elbow,	250 9.8	PILOSITY.	Total Strength,		470
	Left Elbow,	250 9.8		LUNG CAPACITY,		4.3 267
	Right Forearm,	270 10.6		PILOSITY.		2

TABLE V.
TABLE OF COLLEGE CLASSES.

AGE, in years and months.	WEIGHT, in pounds and <i>Kilos.</i>	HEIGHT, in inches and <i>Millimeters.</i>	CHEST GIRTH, in inches and <i>Millimeters.</i>	ARM GIRTH, in inches and <i>Millimeters.</i>	FOREARM GIRTH, in inches and <i>Millimeters.</i>	LUNG CAPACITY, in cubic inches and <i>Litres.</i>	PULL UP, number of times.	
22-4	141.88 64.55	67.96 1726	35.88 911	11.78 299	11.07 280	252.0 4.13	10.99	Seniors.
21-10	140.59 63.77	67.86 1724	35.61 904	11.72 298	11.07 280	250.0 4.10	11.12	Juniors.
20-3	138.24 62.70	67.61 1717	35.50 902	11.70 297	10.93 278	249.9 4.09	10.35	Sophomores.
19-2	132.99 60.32	67.40 1712	34.35 878	10.99 279	10.40 264	239.5 3.97	8.65	Freshmen.

ANTHROPOMETRIC MEASUREMENTS.

NUMBER.—In order to secure privacy the individual should be entered in the record book by number. As a means of identification the number can be entered in an alphabetical index book opposite the corresponding name, as :

Smith, John H.,

526.

For further convenience it is advisable to enter the name in a numerical index book opposite the corresponding number, as :

526,

John H. Smith.

DATE.—Record the year, month, day and hour, as : Jan., '86, 12, 9 A. M. Where perfect accuracy is desired, note should be made of the time that has elapsed since eating, the occupation of previous hours, and of the temperature of the room.

AGE.—Record years and months, as : 21, 9, *i. e.*, twenty-one years and nine months.

WEIGHT.—The weight of the body should be taken without clothes. Where this is impracticable the weight of the clothes should be deducted.

HEIGHT.—The height should be taken without shoes and with the head uncovered. The head and figure should be held easily erect, and the heels together. This position is best secured by bringing the heels, the buttocks, the spine between the shoulders and the back of the head, in contact with the measuring rod.

HEIGHT OF KNEE.—The subject should place one foot on a box or chair of such a height that the knee is bent at a right angle. A box about 12 in. high is suitable for adults. Press a ruler

upwards with a force of about one pound against the ham string tendons close to the calf of the leg. See that the ruler is held in a position at right angles to the vertical rod, and measure the height of the top of the ruler from the box.

HEIGHT SITTING.—Let the subject sit on a hard, flat surface about 12 inches high, such as afforded by a box or chair, with the head and figure easily erect so that the measuring rod will touch the body at the buttocks, between the shoulders, and at the back of the head. Measure the distance from the box to the vertex.

HEIGHT OF PUBES.—With the subject standing easily erect on the box or floor, measure up to the lower edge of the pubic bone.

HEIGHT OF CROTCH.—With the subject standing easily erect on the box or floor facing the vertical rod, press a ruler firmly against the perineum (crotch) and measure the height of the top of the ruler.

HEIGHT OF NAVEL.—With the figure and head of the subject erect, measure the height of the centre of the cicatrix.

HEIGHT OF STERNUM.—With the figure and head of the subject erect, measure the height of the interclavicular notch.

GIRTH OF HEAD.—This measurement should be taken around the head with the tape at the upper edge of the eye brows, over the supra orbital and occipital prominences. All girths should be made on the skin itself and at right angles to the axis of the body or limb at the point of measurement. No oblique measurements are taken.

GIRTH OF NECK.—With the head of the subject erect, pass the tape around the neck half way between the head and body, or just below the “Adam’s apple.”

GIRTH OF CHEST.—Pass the tape around the chest so that it shall embrace the scapulæ and cover the nipple. The arms of the subject should be held in a horizontal position while the tape is being adjusted and then allowed to hang naturally at the sides. Take the girth here before and after inflation.

Where it is desirable to test the elasticity or extreme mobility of the walls of the chest, a third measurement may be taken after the air has been forced out and the chest contracted to its greatest extent. To test the respiratory power, independent of muscular development, pass the tape around the body below the pectora line and the inferior angles of the scapulae, so that the upper edge shall be two inches below the nipples. Take the girth here before and after inflation.

GIRTH OF WAIST.—The waist should be measured at the smallest part after a natural expiration.

GIRTH OF HIPS.—The subject should stand erect with feet together. Pass the tape around the hips above the pubes over the trochanters and the glutei muscles.

GIRTH OF THIGHS.—With the feet of the subject about six inches apart, the muscles set just enough to sustain the equilibrium of the body and the weight distributed equally to each leg in gluteal fold, measure around the thigh just below the nates.

GIRTH OF KNEE.—With the knee of the subject straight and the weight of the body equally supported on both legs, measure over the centre of the patella.

GIRTH OF CALF.—With the heels down and the weight of the body supported equally on both feet, the tape should be placed around the largest part of the calf.

GIRTH OF INSTEP.—Measure around the instep at right angles with the top of the foot, passing a point at the bottom of the foot midway between the end of the great toe and back of the heel.

GIRTH OF UPPER ARM.—With the arm of subject bent hard at elbow, firmly contracting the biceps and held away from the body in a horizontal position, pass the tape around the greatest prominence. If desirable to find the girth of the upper arm when the biceps is not contracted, the arm should be held in a horizontal position and measured around the most prominent part.

GIRTH OF ELBOW.—Taken around the internal condyle of the humerus while the arm of the subject is straight, with the muscles of the forearm relaxed.

GIRTH OF FOREARM.—Taken around the largest part. The fist should be firmly clinched and the palm of the hand turned upward.

GIRTH OF WRIST.—With the hands of the subject open and the muscles of the forearm relaxed, measure between the styloid process and the hand.

BREADTH OF HEAD.—The breadth of head should be taken at the broadest part. In taking the breadth measurements, stand behind the subject.

BREADTH OF NECK.—Taken at the narrowest part with the head of the subject erect and the muscles of the neck relaxed.

BREADTH OF SHOULDERS.—With the subject standing in a natural position, elbows at the sides, shoulders neither dropped forward nor braced backward, measure the broadest part two inches below the acromion processes.

BREADTH OF WAIST.—Taken at the narrowest part.

BREADTH OF HIPS.—Measure the widest part over the trochanters, while the subject stands with feet together, the weight resting equally on both legs.

BREADTH OF NIPPLES.—Taken from centre to centre with the chest in a natural position.

DEPTH OF CHEST.—Taken after a natural inspiration. Place one foot of the calipers on the sternum midway between the nipples, and the other foot on the spine at such a point that the line of measurement is at right angles with the axis of the spinal column. When it is desirable to ascertain the extent of the antero-posterior movement of the chest, measurements may be taken from the same points after the fullest inspiration and after the fullest expiration.

DEPTH OF ABDOMEN.—Place one foot of the calipers immediately above the navel, the other on the spine at such a point that the line of measurement is at right angles to the axis of the spinal column.

LENGTH OF SHOULDER TO ELBOW.—With the arm of the subject bent sharply at the elbow and held at the side, measure from the top of the acromion process to the olecranon. Care should be taken that the measuring rod is parallel with the humerus and not with the external surface of the arm.

LENGTH FROM ELBOW TO FINGER TIP.—With the arm of the subject bent sharply at the elbow and the rod resting on back of arm and hand, measure from the olecranon process to the tip of the middle finger.

LENGTH OF FOOT.—Take the extreme length of foot from the end of the first or second toe to the back of the heel, about one inch from the surface upon which the foot rests.

STRETCH OF ARMS.—With the arms of subject stretched out horizontally so that both hands and shoulders are in a line, with one middle finger and the zero end of the measuring rod pressed against the wall, note the point to which the other middle finger tip reaches.

HORIZONTAL LENGTH.—With the heels of the subject pressed hard against a perpendicular wall, with arms at the sides and body resting naturally on a horizontal plane, measure the distance of the apex of the head from the wall.

CAPACITY OF LUNGS.—The subject after loosening the clothing

about the chest and taking a full inspiration, filling the lungs to their utmost capacity, should blow slowly into the spirometer. Two or three trials may be allowed.

EXPIRATORY STRENGTH.—As before, the subject after loosening the clothing about the chest and filling the lungs completely, should blow with one blast into the manometer. Care should be taken that no air is allowed to escape at the sides of the mouth, and that in expelling the air all the muscles of expiration are brought into play.

STRENGTH OF BACK.—The subject, standing upon the iron foot-rest, with the dynamometer so arranged that when grasping the handles with both hands his body will be inclined forward at an angle of 60° , should take a full breath and without bending the knees, give one hard lift, mostly with the back.

STRENGTH OF LEGS.—The subject while standing on the foot-rest with body and head erect, and chest thrown forward, should sink down, by bending the knees, until the handle grasped rests against the thighs, then taking a full breath, he should lift hard principally with the legs, using the hands to hold the handle in place.

STRENGTH OF CHEST.—The subject with his elbows extended at the sides until the forearms are on the same horizontal plane and holding the dynamometer so that the dial will face outward and the indicator point upward, should take a full breath and push vigorously against the handles, allowing the back of the instrument to press on the chest.

STRENGTH OF UPPER ARMS, TRICEPS.—The subject, while holding the position of rest upon the parallel bars, supporting his weight with arms straight, should let the body down until the chin is level with the bars, and then push it up again until the arms are fully extended. Note the number of times that he can lift himself in this manner.

STRENGTH OF UPPER ARMS, BICEPS.—The subject should grasp a horizontal bar or pair of rings and hang with the feet clear from the floor while the arms are extended. Note the number of times that he can haul his body up until his chin touches the bar or ring.

STRENGTH OF FOREARMS.—The subject, while holding the dynamometer so that the dial is turned inward, should squeeze the spring as hard as possible, first with the right hand then with the

left. The strength of the muscles between the shoulders may be tested with the same instrument. The subject, while holding the dynamometer on a level with the chest, should grasp it with handles and pull with both arms from the centre outward.

TOTAL STRENGTH.—The TOTAL STRENGTH is purely an arbitrary, and relative, rather than an actual test of strength as its name would indicate. And while confessedly imperfect, it seems decidedly desirable that there should be some method of comparison which does not depend entirely on lifting a dead weight against gravity, or steel springs.

The bodily weight is multiplied by the sum of the “Dip and Pull.” (This is divided by ten simply to prevent too great a number of figures in the calculation.) To this is added the strength of back, the strength of legs, the average of the forearms, and the lung strength. The sum is the Total Strength.

For example, the weight of No. — is 64.6 kilos. The Dip is 11, the Pull 12=23. The Back Strength is 125, the Leg Strength 150, the Forearms 40 and the Lungs 1.4. Or, $64.6 \times 23 \div 10 + 125 + 150 + 40 + 1.4 = 464.9$.

PILOSITY.—Note the amount of hair on the body and limbs, excluding the head, face and pubes.

COLOR OF HAIR.—*Light* (Very Fair, Fair, Light Brown, Brown), *Dark* (Dark Brown, Black Brown, Black). *Red* (Red Brown, Red, Golden).

COLOR OF EYES.—*Light* (Dark Blue, Blue, Light Blue). *Dark* (Light Brown, Brown, Dark Brown, Black). *Mixed* (Gray, Green).

DIRECTIONS FOR TESTING THE REFRACTIVE CONDITION OF THE EYE.

PREPARED BY DR. H. H. SEELYE.

Procure of any optician two pairs of spectacles, one with convex glasses, No.+.75 Dioptric (equal to No.+.48 in the old or English system), and the other with concave glasses, No.—.75 Dioptric. Also obtain a copy of Monoyer's test letters (a card of Dr. Den-

nett's modification of Monoyer's test type may be procured of Meyrowitz Bros., opticians, 295 and 297 Fourth Ave.. New York City). to be hung up at 5 meters distance, and a copy of Green's astigmatic lines, in the form of a clock face, to be hung up at the same distance.

Test:—Seat the subject at a distance of five meters from the test cards, which should be hung in a good light. Examine each eye separately, keeping the other covered by a card or small book held in front of, but not touching it. Never press the fingers against the closed lid.

There are ten lines of letters on the test card, numbered from .1, .2, .3, etc.. up to ten 10ths or 1. If now the subject can read the top line, the smallest letters on the card, with the right eye (R.E.) alone, his vision (V.) is recorded as ten 10ths or 1. (V.R.E.=1.) If he sees nothing clearly above the fifth line from the bottom, but can read that correctly, then V.R.E.=.5. If he cannot read any of the lines, then V.R.E.=0, (*i. e.* less than one-10th). Whatever the vision without glasses may prove to be, *always next* put on the *convex* spectacles and again cover the other eye. If now he can still with the right eye see as well or better than with no glasses at all, and can read the same line as before, he is Hypermetropic (H.) in that eye. For example, if without glasses it was found that V.R.E.=.5, and now after adding the convex glass his V. is improved to .8, the record would be V.R.E.=.5, +H.=.8. But if the vision is neither improved nor made worse by the convex glass, the record will be thus: V.R.E.=.5, +H.=.5. If the convex glass can be used at all without decreasing the vision, no further testing with this card is needed; the subject is hypermetropic in that eye.

If it is found that the vision of the right eye equals 1. without glasses, and then the addition of the convex glasses blurs the letters, the eye is Emmetropic, that is, the vision is normal (V.R.E.=1.).

If, however, the vision without glasses is less than 1., for instance only .3, and the convex glasses make even that line more indistinct, then put on the *concave* glasses. If now the vision is improved so that a higher line can be read, for instance the eighth from the bottom, the eye is Myopic, or "near sighted," and the record will be V.R.E.=.3, +My=.8. Or again, if the vision without glasses in the left eye is found to be .7 and then with the

concave glass the top line can be read, the record will stand thus : V.R.E.=.7,+My.=1. After testing each eye separately, place the record of one above the other, for example thus :

$$\begin{cases} \text{V.R.E.}=1. \\ \text{V.L.E.}=.6,+ \text{My.}=.9. \end{cases}$$

This completes the testing for simple hypermetropia, myopia and emmetropia.

After testing the eyes as above, if the vision has not yet been made perfect in either, leave on the proper correcting glass. the convex if there is hypermetropia, or the concave if there is myopia. or use no glass if there is neither ; then direct the subject's attention with that eye alone, the other being covered. to the card of radiating black lines. If he sees one or more of the lines running in any direction clearer or blacker than those at right angles to them, he is shown to be astigmatic. Either the perpendicular or the horizontal lines usually appear the blacker to the astigmatic person. If the previous record was V.R.E.=.7 and this defect is found, then it will be V.R.E.=.7,+As. Or if before it read : V.L.E.=.3,+My.=.6. and astigmatism is found, it will read. V.L.E.=.3,+My.=.6,+As. Astigmatism may exist either alone or in combination with My. or H. If alone we might have a record thus : V.R.E.=.6,+As. ; V.L.E.=.4,+As., or if with hypermetropia thus : V.R.E.=.7,+H.=7,+As. ; V.L.E.=.6,+H.=.8,+As.

To recapitulate, in brief ; if it is found that V.R.E.=1, then the R.E. is either Emmetropic or Hypermetropic. If emmetropic, the convex glass will markedly impair the vision : if hypermetropic it will not. If the V.R.E.=.9 or less, then the R.E. is either hypermetropic, myopic, astigmatic or amblyopic.

1st. If it is H. the the convex glass will not greatly impair the vision.

2nd. If it is My. the concave glass will improve V.

3rd. If it is As. one of the radiating lines is blackest.

4th. If neither of these defects exists and the V. is less than .7 then Amblyopia or partial blindness may be recorded. It may read thus : V.L.E.=.6,+Am.

Caution.—Always try the convex glass. Never try the concave unless the convex glass blurs the vision.

In the following cases the subject should be recommended to consult an oculist concerning the advisability of wearing glasses : If the vision without any glasses is less than .4 in either or both

eyes; if he complains of weak, watery or painful eyes, especially in reading, and any degree of hypermetropia or astigmatism is found to exist.

DIRECTIONS FOR TESTING THE COLOR SENSE.

A reliable set of test worsteds of different colors may be procured for \$1.25 of N. D. Whitney, 129 Tremont St., Boston. Among these will be found three large test skeins colored light green, purple (pink or rose), and bright red. To make the examination, spread all the worsteds out on a white cloth placed upon a table. First lay the *green* test skein a little to one side of the others, and then tell the subject to throw out of the pile and lay along side of the test skein all the lighter and darker shades of that color, or all the skeins containing a shade of that color in any degree. Avoid naming the color "green" to him. If he throws out only shades of green or light blue his color sense is normal (C.S.N.) and the test is completed. But if in addition he throws out light grays, or any other shade of gray, or light yellows, salmons, or pinks, he is color-blind. If he handles or fumbles over those shades a good deal and hesitates, as if in doubt about them, but yet does not throw them out, he probably has "feeble color sense" (C.S.F.). The examiner in these cases must use his judgment in making a certain amount of allowance for the stupidity of some persons in understanding what is wanted, especially in the young and uneducated.

If the subject is found to be color-blind, next lay down the purple or rose-colored test-skein, in place of the green, in order to determine the nature of the defect. Now tell him to throw out all the different shades of that color. If he only throws out pinks and light reds and shades approaching these he is only partly color-blind. (P.C.B.) But if he throws out decidedly bluish purples, blues, violets, greens, or grays, he is completely color-blind. (C.C.B.) Completely red blind if he throws out the blues, violets, etc., or green blind if the grays or greens.

No further testing is needed, but as a matter of curiosity and to prove the result, the red test skein may next be tried in the same way. If he matches with it browns or greens and grays he is completely color-blind. Dark brown or green if red blind, and light brown or green if green blind.

It is not important to record whether the complete color-blindness is red or green blindness. The following classes may be recorded:—Color sense normal=C.S.N.; Color sense feeble=C.S.F.; Partial color-blindness=P.C.B.; Complete color-blindness=C.C.B.

Color-blind individuals should be warned against engaging in any occupation where this defect would prove dangerous or inconvenient.

DIRECTIONS FOR TESTING THE CONDITION OF THE EARS.

Use an ordinary watch and a tuning fork, letter A. or C., as tests. Seat the subject with his right side toward you, and then while the room is perfectly quiet, see how far off he can hear the watch tick. Having previously learned by a few experiments what is the furthest distance at which the tick can be heard by normal ears, make that number of inches the denominator of a fraction, and the hearing distance of each person examined thereafter the numerator. Having found the normal distance (=H.D.) to be, for instance, about sixty inches, and that of the subject now examined to be, say forty inches, his record for the right ear would then be: $H.D.R.E.=\frac{40}{60}$. If it had been $\frac{60}{60}$ or 1, the ear would be normal. $\frac{80}{60}$ would show an abnormally acute sense of hearing. If the watch could only be heard while in *contact* with his ear, it would be recorded: $H.D.R.E.=\frac{0}{60}$. If not heard at all, then $H.D.R.E.=\frac{0}{60}$. Next test the left ear in the same way. Voice sounds in talking will often be easily heard by persons quite deaf to the watch tick, so the latter is not always a reliable practical test.

Suppose we have found $H.D.R.E.=\frac{40}{60}$, $H.D.L.E.=1$, this implies some deafness in the right ear, and the tuning fork will now help us to decide whether the cause lies in some defect of the auditory nerve or internal ear, or in the external or middle ear or Eustachian tube. Strike the fork against some solid substance, and then place the end of the handle against or between the subject's front teeth. If both ears are normal he will probably seem to hear the ringing of the fork equally well in both ears. But if there is a defect in one ear he will either seem to hear it louder or more feebly in the affected ear. If, as in the case we are examining, the fork is heard best in the deaf ear, this tells us that the deafness is due to some defect in the more external parts of the

organ, and it can probably be corrected by appropriate treatment. But if it is heard best in the good ear, it goes to prove that the defect in the other ear is more deeply seated and cannot probably be greatly benefited by treatment. This effect of the tuning fork is contrary to what would ordinarily be expected, and it is often a matter of surprise to a deaf person to find that he hears with his teeth apparently better on the deaf side.

We may now add to our record in this case: T.F. best R.E. If it had been heard equally well in both ears we would record: T.F.=N. (or normal). Where the defect in hearing is at all marked a specialist in ear diseases should be consulted.

Our record in a normal case might be thus: H.D.R.E.=1, H.D.L.E.=1, T.F.=N.; or in an abnormal case it might be thus: H.D.R.E.=1, H.D.L.E.= $\frac{0}{60}$, T.F. best in R.E. This would imply that the subject was so deaf in the left ear as not to be able to hear the watch tick at all, and the fork held between the teeth could be heard best in the good ear, consequently his trouble is probably seated in the deeper structures of the ear, or in the nerve itself, and treatment would not be expected to help him greatly. The tuning fork need not be tried unless the watch tick shows some defect in hearing.

TO EXAMINE THE LUNGS AND HEART.

Procure a Camman's Binaural Stethoscope. Before the subject tries any of the strength tests, let him be seated, and while the breathing and circulation are easy apply the stethoscope to various parts of the chest. The faint respiratory murmur heard everywhere will soon become familiar, and any unusual sounds should be noted as abnormalities. These may be crackling, bubbling or whistling sounds of varying intensity. Or the respiratory murmur may be abnormally loud or entirely absent. Note whether these sounds change or disappear with deep breathing after violent exercise.

Next listen to the heart sounds. Place the stethoscope over the apex of the heart, one inch below and to the right of the left nipple. Both sounds should be heard most distinctly here. Then place the instrument two inches above this spot and listen. Then place it two inches below the centre of the top of the sternum, or breast bone, and listen in this vicinity. Any abnormal heart sounds are apt to be heard most distinctly at one of these points.

In organic heart diseases rough grazing or blowing sounds are heard with one or both of the normal heart sounds. Take no notice of an arterial murmur heard loudest under the outer half of each collar bone, which often closely resembles an abnormal heart murmur, especially after violent exercise.

If all the heart sounds are natural, then let the subject take the arm tests of pulling up or dipping, and immediately after let him be seated again, and then listen to see if the heart and lung sounds are still natural, though intensified by the exertion just made. Also note any irregularity in the rhythm of the heart sounds or any intermission in the beat or great increase of rapidity. There may be such, as functional disturbances, without any organic disease. When the breathing and heart sounds seem abnormal advise consulting a physician.

The ESSENTIAL APPARATUS for securing these statistics, and their approximate cost are :

Fairbanks's scales,	\$18.00
Measure for heights,	9.00
“ “ breadths,	4.00
Back and Leg Dynamometer,	30.00
Hand Dynamometer,	15.00
Lung Dynamometer,	15.00
Lung Spirometer,	17.00
Tapes,	1.00

ALSO

A Record book,	\$8.00
A Stethoscope,	3.00
Set of colored worsteds,	1.25
Cards for Eye Tests,	1.00
Two Pairs of Spectacles,	3.00
Tuning Fork,	.35

ERRATA AND ADDENDA.

Page 10 should follow page 7; page 11 should follow page 8; and page 12 should follow page 9.

The "Anthropometric Measurements" are not an exact transcript of the anthropometric committee of the A. A. P. Education, but are intended to meet the slight modifications of that report as they are practiced at Amherst.

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